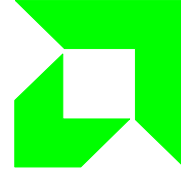


# Advanced Micro Devices



Mobile Computing Division  
5204 E. Ben White Blvd.  
Austin, TX 78741

## Elan *MMSVIEW.EXE* Memory Management System (MMS) Discovery Utility

### **Introduction**

This document covers the purpose and use of *MMSVIEW.EXE* version 1.0. This utility is part of the collateral for the AM386SC300 silicon engine device which will be referred to simply as “Elan” for the remainder of this document. Elan is a highly integrated device with many subsystems. Many of these subsystems are unique to Elan. The purpose of the *MMSVIEW* utility is to provide the new Elan user with the ability to explore the capabilities of Elan’s MMS subsystem without having to invest much in the way of software development or chip register learning time.

### **Description**

*MMSVIEW* is a DOS application that may be used to inspect various resources that are accessible by the Elan MMS subsystem. These resources include *SYSTEM RAM*, the *BIOS ROM* (or resources accessed by ROMCS# signal), the *DOS ROM* (or resources accessed by the DOSCS# signal), or the *PCMCIA* slots. With this utility, the following operations may be performed:

- Directly display any region of the system RAM (0-16mb range), BIOS ROM (0-16mb range), DOS ROM (0-16mb range), and PCMCIA (0-64mb range).
- Step forward or backward through the data in 256 byte steps or 16kb steps.
- Select to view PCMCIA common or attribute memory.
- Choose between viewing data from PCMCIA slot 1 or slot 2.
- Select any Elan MMS page from MMSA to view system resources through.
- Fill areas of PCMCIA SRAM card memory or system RAM memory with a selected byte.
- Append the currently displayed page of data to a log file in either ASCII or binary formats.
- View DOS ROM using 8 or 16 bit interface.
- Perform continuous read/compare operations from a selected resource, and indicate mismatches on the display.

## **Scope**

MMSVIEW is provided to enable discovery and understanding of the capabilities of Elan's MMS system. It has other uses such as looking at the contents of PCMCIA card attribute memory to view CIS (Card Information Structure) or common memory to view card data, filling areas of system RAM and PCMCIA SRAM cards, and looking at DOS ROM disks to ensure that the odd/even parts are placed in the sockets correctly to name a few. It is not designed to be a comprehensive or automated diagnostic program, although its use may help in the debug of certain problems.

MMSVIEW uses MMSA only. To retain compatibility with systems using VGA video, MMSB was left outside the scope of this tool. It was designed on, tested on, and meant for use on the Elan AM386SC300 evaluation board revision 2.1 or later. The fact that it may run on other customer platforms is purely coincidental.

## **IMPORTANT**

No support of any kind will be provided for porting this utility to any platform other than the Elan evaluation board 2.1 or later except by special agreement between AMD and the customer.

## **Operating instructions**

### **Command line parameters**

MMSVIEW assumes that MMS page 4 (resides at D0000h when MMS page 0 is set up to reside at C0000h) is available for use. This default may be overridden using a command line parameter as shown below:

MMSVIEW [*page*]

where *page* is a number from 0-7 to indicate the initial MMS page to view the system resources through. If an invalid command line parameter is detected (not a number, out of range, etc.) the default MMS page (4) will be used. This option is provided to allow resolution of system address space conflicts that may occur when using this program while some other driver is loaded (EMM386, etc.).

There are no other command line parameters available.

### **Initial state**

After MMSVIEW has been invoked from the DOS command line, data is displayed in a fashion similar to DOS debug. MMSA page 4 at D0000h is selected, and the device that is accessed is system RAM. The first 256 bytes of the selected device is displayed starting at offset 0. In other words, the start of the interrupt vector table at 0:0 in RAM.

### **Keystroke commands**

Keystroke commands are invoked by simply pressing the keys noted below. Whenever a keystroke command requires user input, prompts will request the required data. If a command that requires user input is to be aborted without invoking the command, press the escape key, and the main data display will return. A command summary follows:

? Pressing the question mark key from the main data display screen displays a quick help list of the keystroke commands available to the utility. Press the SPACE BAR from the quick help screen to return to the normal main display screen.

**Space Bar** The space bar (or any key besides the other command keys listed in this section) simply rereads the data from the selected resource, and refreshes the main data display screen. The main data screen does not constantly update normally. If, for example, you are viewing PCMCIA PC card Information Structure (CIS) data for one card, and you replace this card with another, the data printed on the screen does not automatically update. To view the data from the new card press the space bar (or any other non command key as specified in this list) to refresh the screen with the new data. For a continuous read mode, see the 'c' command below.

+ The plus key moves forward through the data 256 bytes at a time. The numeric keypad plus key thus makes it simple to view the next 100h bytes of data on the selected device.

- The minus key performs the inverse operation of the plus key, and causes the previous 256 bytes of device data to be displayed. The program disallows negative addresses, and gives a warning click from the speaker if you press the minus key when the first address displayed on the screen is 0.

**a** The 'a' key toggles between common and attribute memory for the current PCMCIA slot. When switching between slots using the 's' command, the state of the -REG line is remembered for each slot. This allows you to switch back and forth between the CIS of cards in slot A and slot B for comparison purposes.

**c** The 'c' key is useful for detecting changes in reading the data from a given resource. An example application for this feature is in the detection of timing problems (incorrect wait state setup, etc.) of PCMCIA cards, etc. When you press the 'c' key, a "snapshot" of the current device data is taken, and stored into a local buffer. After this, continuous reads of the current device data are compared to the buffer. Mismatches cause the offending byte location to flash, and the result of an EXCLUSIVE OR between the buffer (snapshot) and the current device data is displayed. This allows bit errors to be picked out easily. Upon leaving continuous read/compare mode, the blink attribute is removed from the characters for easier reading of the resulting data. The bytes which have the bit mismatches are left highlighted in white (Vs. light gray for the normal data). Any new command which causes the data to be read from the device again removes the highlight attribute from the displayed data completely. If the highlight attribute needs to be removed without losing the bit error data which may have been captured, the 'r' command may be used (see below).

**d** The 'd' key selects which device the current MMS page points to. Pressing the 'd' key causes the system to prompt for the new device. Enter a number from 0 - 3 (0 = DOS ROM, 1 = system RAM, 2 = PCMCIA, 3 = BIOS ROM), and press enter. Invalid input will not be accepted. Once a new device has been entered, the main data display will return showing the data read from the selected device AT THE CURRENT OFFSET. In other words, if you are looking at the DOS ROM at offset 4000h, for example, and you use the 'd' command to select the BIOS ROM, the data displayed will be from offset 4000h of the BIOS ROM.

**f** The 'f' command allows a range of memory to be filled with a user selectable byte. Pressing the 'f' command brings up prompts for the start and stop fill addresses, and requests the fill byte. Fill operations are available only when PCMCIA or RAM is the selected device. This command does not know how to write to flash devices in a DOS ROM socket, or any PCMCIA card type other than SRAM.

**g** The 'g' command allows you to "go" to any place in the memory map desired. It is the random access equivalent to the plus and minus keys. It provides one additional benefit in that the data byte which resides at the address specified by the user to go to is highlighted for easy recognition.

**I** The 'I' key allows the DOS ROM interface to be toggled between the 8 and 16 bit interfaces supported on Elan. This is useful if running the utility on the Elan demo board, for example, which has an 8 bit DOS ROM interface as opposed to the 16 bit DOS ROM interface on the Elan evaluation board.

**l** The 'l' command allows one screen's worth of data to be appended to a log. Successive screens can be captured to the same file in this manner. Pressing the 'l' command prompts the user as to whether the output file should be a binary image of the data, or whether a DOS debug like ASCII representation should be saved. If the binary option is chosen, data will be logged to a file named MMSVIEW.BIN. If the ASCII option is selected, the output file will be MMSVIEW.ASC.

**n** The 'n' command allows the user to select the use of a new MMS page (0-7). This can be useful in avoiding system conflicts. The default page can be changed before entering the program using the command line capability to set this option as described above.

**p** The 'p' command is essentially a 'g' command that accepts its input in terms of 16k pages. In other words, you can randomly access data on specific 16 kb boundaries using this command. For example, if you want to view the start of the first 16kb boundary of a device, select the p command, and input 0 when prompted to specify page 0. This can be done just as easily using the 'g' command and supplying an address that's a multiple of 4000h.

**r** The 'r' command resets the miscompare indicators as explained earlier in the section that explains the 'c' command. See the 'c' command description for more detail.

**s** The 's' command toggles between viewing data from PCMCIA slot 1 and slot 2. Each time the 's' command is pressed, the slot that is not currently being viewed becomes the active slot. This command only applies if the PCMCIA device is selected.

**Page Up** The page up key displays data on the previous 16k boundary. For example, if the current device data starting at offset 4100h is being displayed, and page up is pressed, the data from device offset 0100h will be displayed.

**Page Down** The page down key does the inverse of the page up key: it displays data from the NEXT 16k boundary.

**Home key** The home key displays the data at offset 0 on the current device.

**Escape** The escape key causes the utility to return control to the DOS prompt. Note that no clean up is done as the program exits, so it is recommended that the user COLD BOOT before performing any other important operations, especially if PCMCIA, ROMDOS, or EMM386 drivers were loaded on the system when MMSVIEW was invoked.

## **Restrictions on use**

Although designed for the Elan evaluation board, this utility may work on other vendor's platforms. There are three key elements for compatibility. First, MMSVIEW assumes that MMSA is programmed to begin page 0 at C0000h. The starting location of MMSA is not reset by the utility in an attempt to maintain software compatibility with customer platforms as this would probably cause the customer's platform to crash. Use this utility on a customer platform only if customer platform initialization programs MMSA page 0 to start at C0000h.

The second element of compatibility is the use of the MMS windows on the customer platform. MMSVIEW assumes that MMS page 4 (resides at D0000h when MMS page 0 is set up to reside at C0000h) is available for use. This may conflict with drivers loaded on the evaluation board platform that require the use of MMS (ROMDOS, PCMCIA, EMM386 to name a few). It may also conflict with customer resources located on customer platforms. See the section above entitled *Operating Instructions* for details on how to change MMS windows

The third element of compatibility is not as major. MMSVIEW reprograms the IO locations of the REGA and REGB signals to reside at 108h and 10Ch respectively. These are the IO addresses that were set up in Phoenix's BIOS port to Elan. These IO locations are set up in this utility in case it is run on a vendor platform in order to achieve some level of software compatibility. When MMSVIEW exits, these locations can not be reprogrammed back to the initial values because these registers are write only. It is recommended that the test platform/evaluation system be "cold" booted (using reset button) after MMSVIEW exits so that Elan setup registers are restored to the proper values before doing further work on the platform. This is required not only on customer platforms, but on any Elan evaluation board that has any PCMCIA, ROMDOS, or EMM386 other drivers installed that require use of the MMS, or memory regions that are controlled by Elan's MMS. Again, MMSVIEW makes no attempt to restore the system to its initial state: RESET THE SYSTEM WHEN FINISHED.

Use caution when selecting the MMS page to use. Selecting a page that causes conflicts with other system resources can lock the system. For example, using a VGA card in the ISA slot of the evaluation board, and selecting pages 0 or 1 of MMSA will cause system conflicts since VGA BIOS decodes at C0000h for 32k bytes, and MMSA pages 0 and 1 also use that address space.

Refer to the Elan errata sheet regarding other MMS issues that may affect the way the system reacts to MMS accesses.

### **Changes for version 1.01**

Some minor changes have been made since MMSVIEW was initially released. The new version is designated 1.01. The version number may be checked by bringing up the help screen (press ? from the data view screen). Version 1.01 has some improved user input number checking that handles leading and trailing spaces in user supplied numbers. It also monitors the PCMCIA card change lines, and automatically updates the internal buffers and data displayed to the screen if a PCMCIA card is changed while the utility is running. These changes are announced by beep tones that can be heard as the card is inserted or removed.

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